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Maine-eDNA: Sustaining coastal ecosystems in Maine and beyond

Maine EPSCoR

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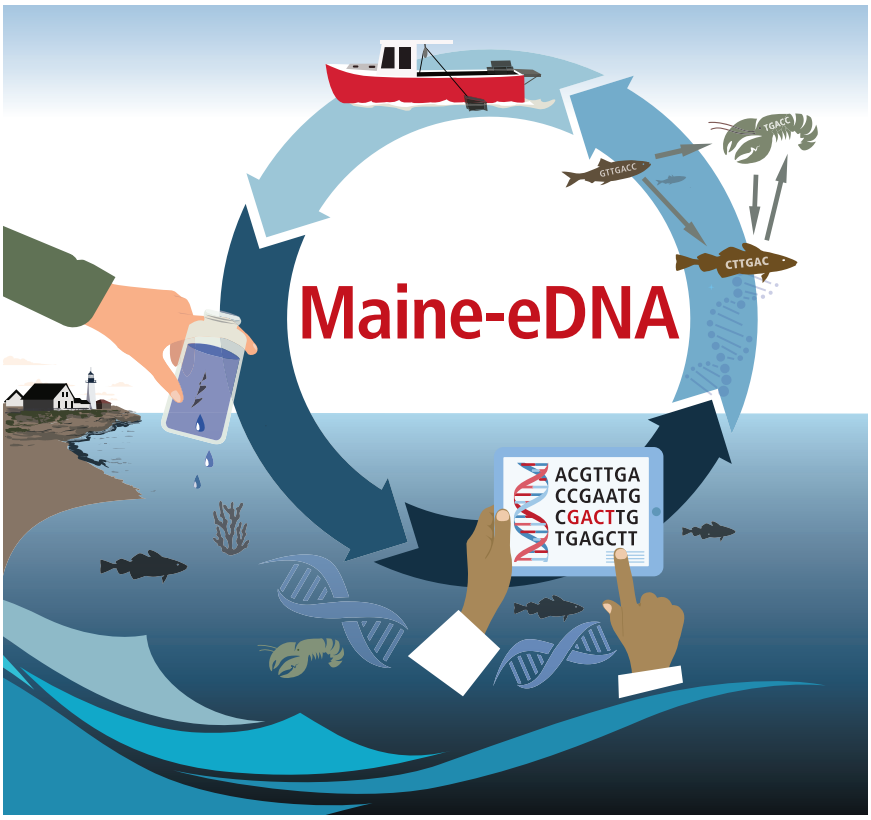
Maine Environmental DNA (Maine-eDNA) is a statewide, multi-institutional initiative establishing Maine as a national leader in environmental monitoring, ecological understanding and sustainability of coastal ecosystems through research, education and outreach.



- A $20-million grant from the National Science Foundation EPSCoR program will fund the five-year 'Maine-eDNA' initiative that aims to revolutionize environmental monitoring and ecological understanding of coastal ecosystems.
- eDNA is the genetic material left behind by organisms in their environments as a by-product of their natural life and death processes. For some microbes, eDNA can come from the whole living organism. For larger organisms, eDNA typically comes from shed skin cells, gametes or waste products. eDNA for aquatic organisms is collected from water or sediment samples.
- Scientists around the world collect and share DNA data to study medical, agricultural and evolutionary questions. For example, in human medicine DNA is used to understand how the building blocks of our bodies interact and function. Similarly, eDNA can help us understand how species — the building blocks of communities — interact to make ecosystems function.
- Environmental DNA is like a genetic fingerprint of a marine ecosystem. Organisms leave traces of DNA wherever they go. These traces can be collected, identified, and linked back to those species, much like evidence at a crime scene. The resulting data can show where, when and how different species and groups of organisms have interacted with each other and their coastal habitats.
- Coastal Maine is rapidly changing due to the effects of finfish and shellfish harvest, restoration efforts, development and climate change. eDNA samples collected by scientists, agencies, industry and citizens can be used to collectively monitor coastal systems and improve outcomes, such as healthy fisheries and aquaculture, or reduce costs from harmful invasive species or toxic algal blooms. Maine-eDNA advances these sustainability goals.
- Collecting eDNA can be more efficient, safe and accessible than current methods — such as nets, trawls or divers — for studying live organisms. A typical eDNA sample is just a bottle of water. The nondestructive method is ideal for studying species that are protected species, hard to capture or difficult to visually identify.
- One of the project's main goals is to share and integrate the data with other monitoring efforts in Maine's coastal communities. Massive amounts of eDNA data can be used to study many future questions.
- The project will provide extensive biotechnology and data science education and workforce development for Maine. eDNA is a rapidly growing area of technological development, providing opportunities for Maine businesses to develop new sampling, lab and data analysis products.
- The national funding through Maine EPSCoR will help create educational opportunities and internships in significant research areas for Maine. This will ensure that students persist in STEM-related fields and grow Maine's workforce.

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